

An  
Inaugural Dissertation.  
on

No 2

Tetanus.

Submitted to the examination  
of the

the

Medical Professors and Trustees.

of the

University of Pennsylvania.

on the day of April 1808

For the degree of Doctor of Medicine

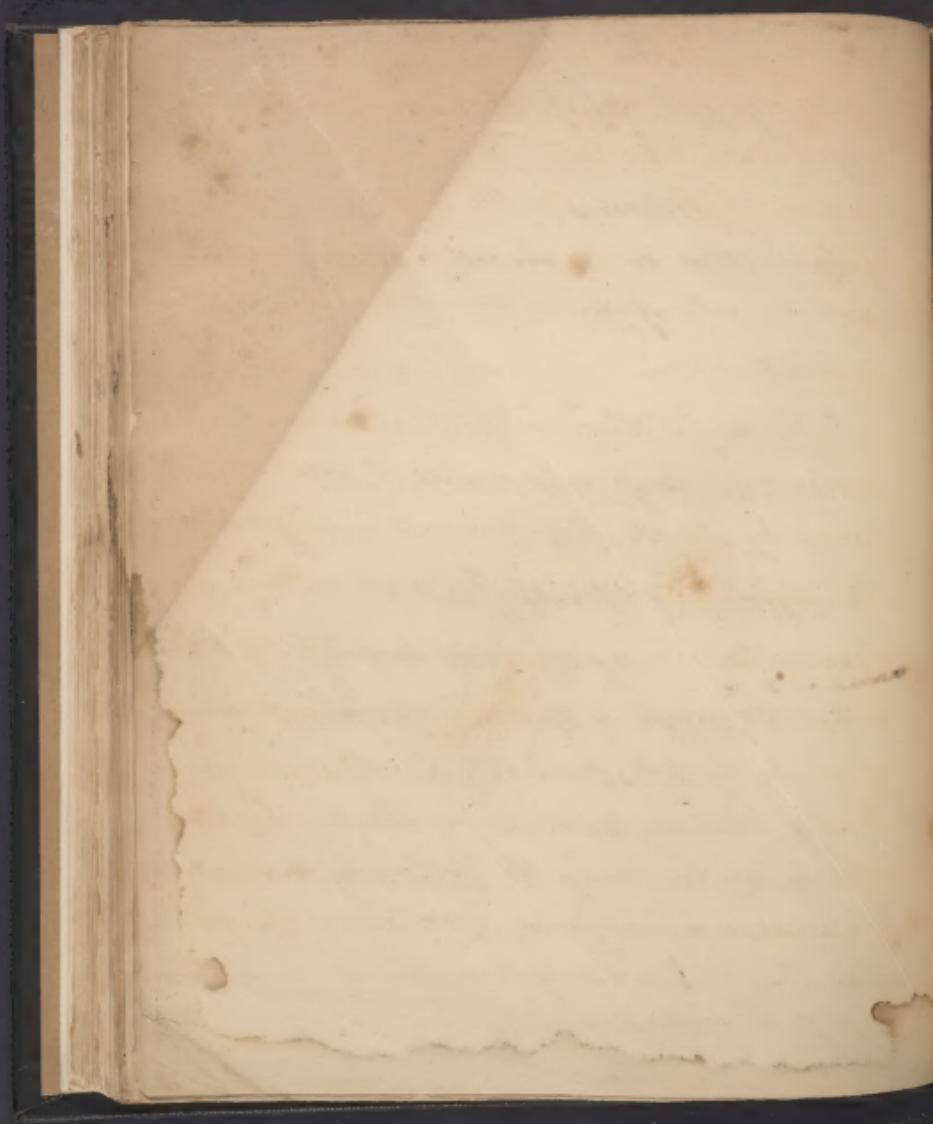
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## On Tetanus.

Tetanus, this is a painful disease, and its frequent mortality, called the attention of the earliest physicians. In the ancient works, we find it described, with some accuracy by Hippocrates; who, supposed wound to be the most general cause.

Since his time, we find it described by various authors, who divide it into several species, by which they mean to distinguish the different stages, of the same disease; and have allotted a name, to each grade of this disease, expressive of the different position of which the body is liable to be thrown into, by the contraction of certain muscles; which positions are known by the following names. viz Tetanos, Omprosthenos, Opisthotonus, Pleurythetanos, &c. The whole of these terms nearly express the same disease.

de deo nunc regnare et illi servari  
intelle illi sicut pater continet  
et regnans unigenitus illi sicut manus eius  
quod per nos erat hoc universum in longo  
tempore illi dico bonorum fructorum etiam illuc

missus sum

Et huiusmodi te dico quia videntur sancti  
sancti tuos te servare abo mortis peccatis  
et misericordia et misericordia vestra  
et misericordia tua illi per regem benissimus illi  
quod per omnes dies et annos a statu et  
ad aliud statu et per indecessum mundi  
et deinceps et illi non potest illi datur  
et secundum carnem et sanguinem et  
et misericordia vestra illi per regem eum reddit  
et misericordia vestra illi per regem eum reddit  
et misericordia vestra illi per regem eum reddit  
et misericordia vestra illi per regem eum reddit

missus eram illi dico

All late writers concur in opinion that tetanus changes with paroxysms; sometimes affecting one part of the body with violent contractions and rigidity of the muscles in the back; then again at short intervals, the opposite muscles are contracted. With those alternate remissions or intermissions, the same person may be said to have tetanus, Opisthotonus, Comprosthotonus all in the space of a short time.

Morley relates 2 interesting cases which corroborate this opinion.

Cafe 1.<sup>11</sup> Once, as I visited the hut of a negro belonging to Mr. Tho Bond, in Kingston in Jamaica, the man had got up in one of the remissions, in an opisthotonus, & was standing on the floor, leaning against his bed. On my speaking to him, he was suddenly seized with violent contractions of all the muscles, which curved him like a bow & sprang up from the ground and stood pitched



backward, with his head foremost nearly straight  
from the place where he stood, among some earthen  
pots that were in the corner of his hut. By the fall  
he cut his head very much, & divided the temporal  
artery. He died within two hours.

Cafe 2<sup>o</sup> In which every part of a woman's body  
was convulsed, or rendered stiff & rigid by tworts.  
Sometimes her head was turned to the right side,  
then to the left, then backward as in the opisthotonos  
-ous, then forward as in the Cymothotonous.<sup>o</sup>

This disease may and does occasionally occur  
in every climate that we are acquainted with.  
yet it occurs most frequent in the Tropical climates,  
and most commonly, in the warmest seasons of  
such climates: so much so indeed; that it has been  
considered endemic in such climates. Hiller  
observes that the orthostich, suffered pretty much  
in a dry cool season; and several persons were seized  
with opisthotonus & tetany from seemingly very slight  
causes.<sup>x</sup>

and the same money used in the Standard  
silver and copper. And it will cost all my  
expenses and the price of it is one half less  
than all the others because it is so

most and better than all silver  
you can get from your mines at 1000  
weight of silver is still lighter and easier to  
carry for all the silver you had and want and  
nothing but it is heavier and the  
silver will stand all the time because with your  
new mine you have your metal all

The changes are as fast. There were no  
parts required in the making of these coins to fit  
to other nations with no differences than one  
and all the old coins or metal coins have

all the metals have no dangerous qualities  
and they will not melt in the sun or water  
and are easily broken, which is good  
for the purpose of money and is not likely to

Mosely likewise remarks tetanus, is endemical among children in many places between the tropics; but by no means, as some have supposed, depending on situations near the sea, or exposed to the winds; when it attack them, it is generally on or the eight or ninth, and seldom after the twelfth or fourteenth day, from their birth<sup>11</sup>.

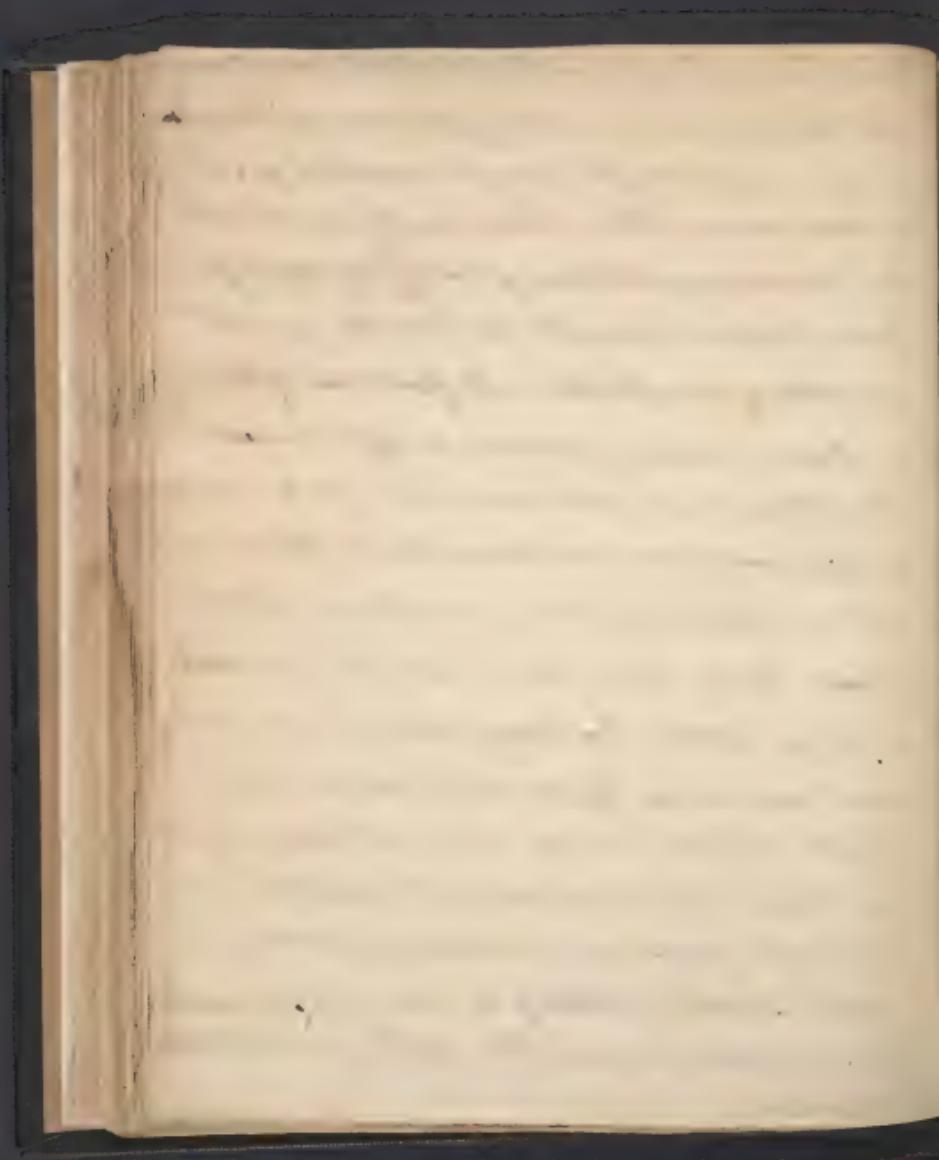
Though the causes do, upon occasion, affect all sorts of persons, they seem however, to attack persons of middle age more frequent than the older or younger, the male sex more frequent than the females, the robust & vigorous more frequent than the weaker<sup>12</sup>.

Mosely remarks the negroes, are more subject to tetanus than the whites. This he suppos'd, is owing to an increase of irritability & diminished sensibility. He likewise observes the algerines & moroccans, are much distinguished for privity of sensibility as the negroes.

<sup>11</sup> Mosely page 523. & Cullen page 225.

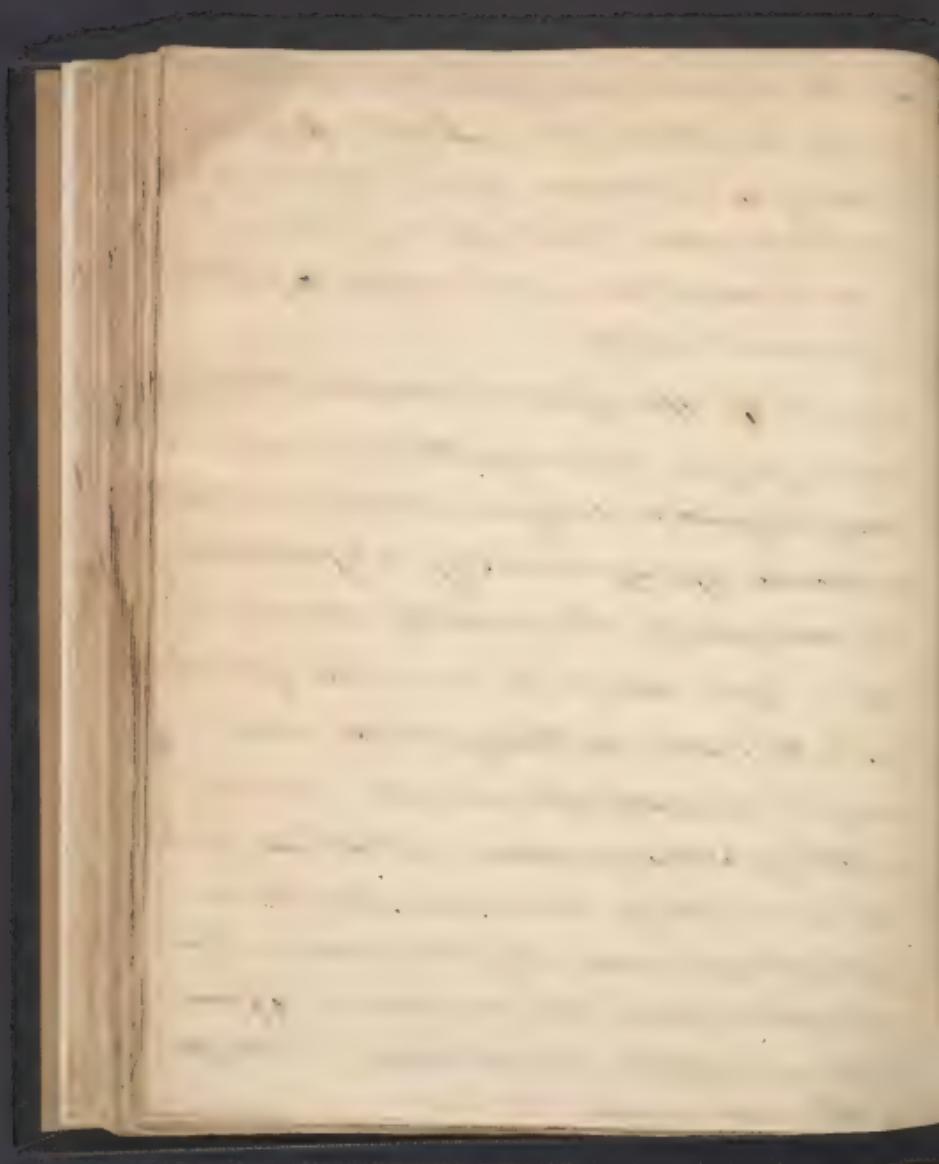


Here, I cannot agree with the illustrious Moro,  
that this increase irritability, and diminishes  
-bility is natural, but may be acquired from  
certain causes. Which I shall briefly enumerate.  
We have many instances of Debility destroying  
pain; hence, criminals can bear the greatest  
punishments inflicted with fortitude; of this  
we have a striking instance, a case mentioned  
by Priestley; a man who was sentence for some crime  
to suffer punishment at stated periods. He bore it  
with unconquerable fortitude, and almost without  
aggravation. Being asked how he bore it, he answered  
he always fasted 2 or 3 days before his punish-  
-ment came on. & Again; Do we not see delicate  
females? who from disease have not taken much  
nourishment, bear operations of the most painful  
kind with composure; and scarcely uttering a  
groan. Further, Bleeding so much recommended  
in parturition to relax the rigidity of the uterine.



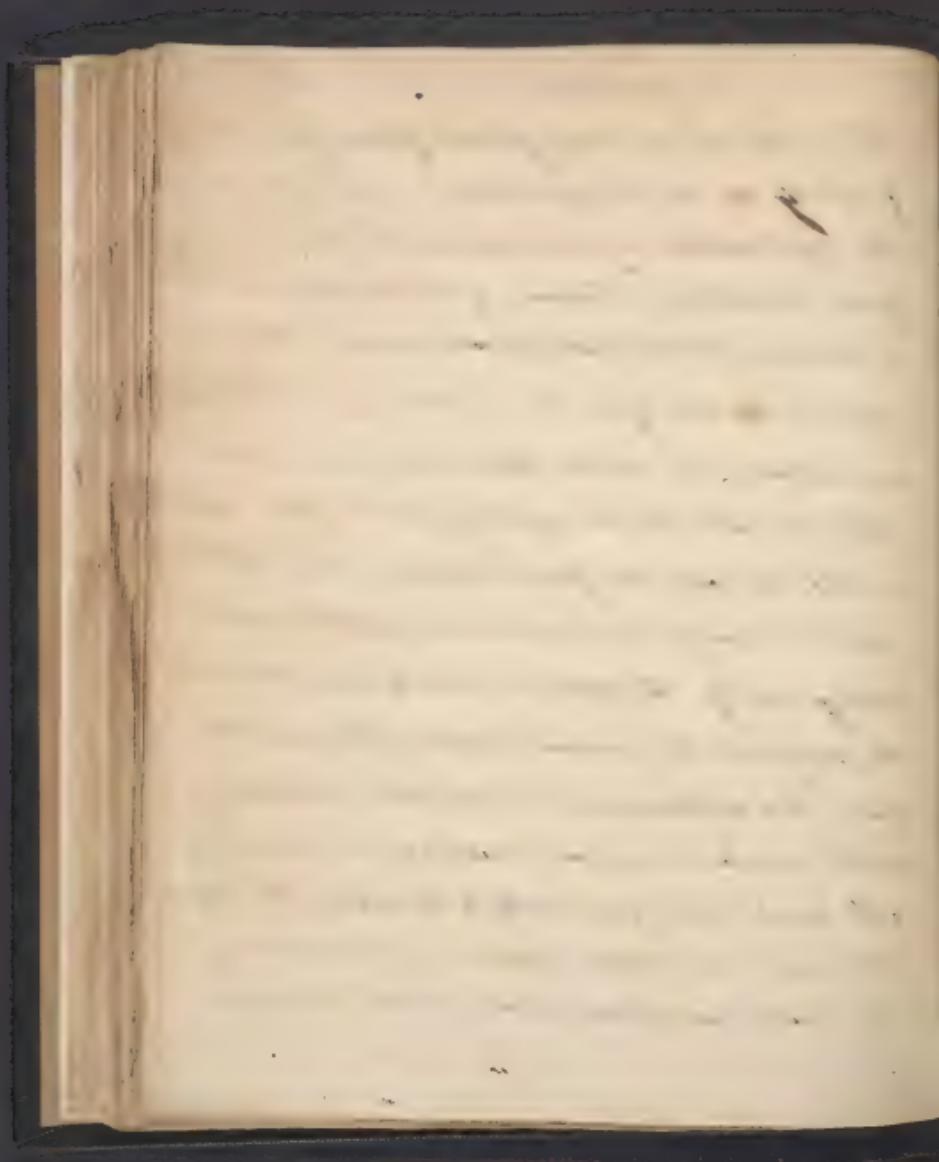
and the adjacent parts; from its anæsthetizing agency, also alleviates pain. Lastly; do we not always give Laudanum before performing a painful operation? this I suppose, is given with a view to palliate pain, which it does by producing indirect debility.

May not the sparing diet, in addition to heat, labour, fatigue &c. to which the negroes are generally confined to, bring on debility? which tho' mentioned destroys sensibility in a great measure and consequently, the irritability will accumulate in equal ratio to the diminution of sensibility. To this I attribute their fortitude under painful operations, and not to the natural irritability, as Many suppose; but to their preternatural irritability. These causes I conceive are sufficient explanation; why! the negroes are more subject to this disease than the whites. Why from better circumstances, are not exposed to many of the above causes.

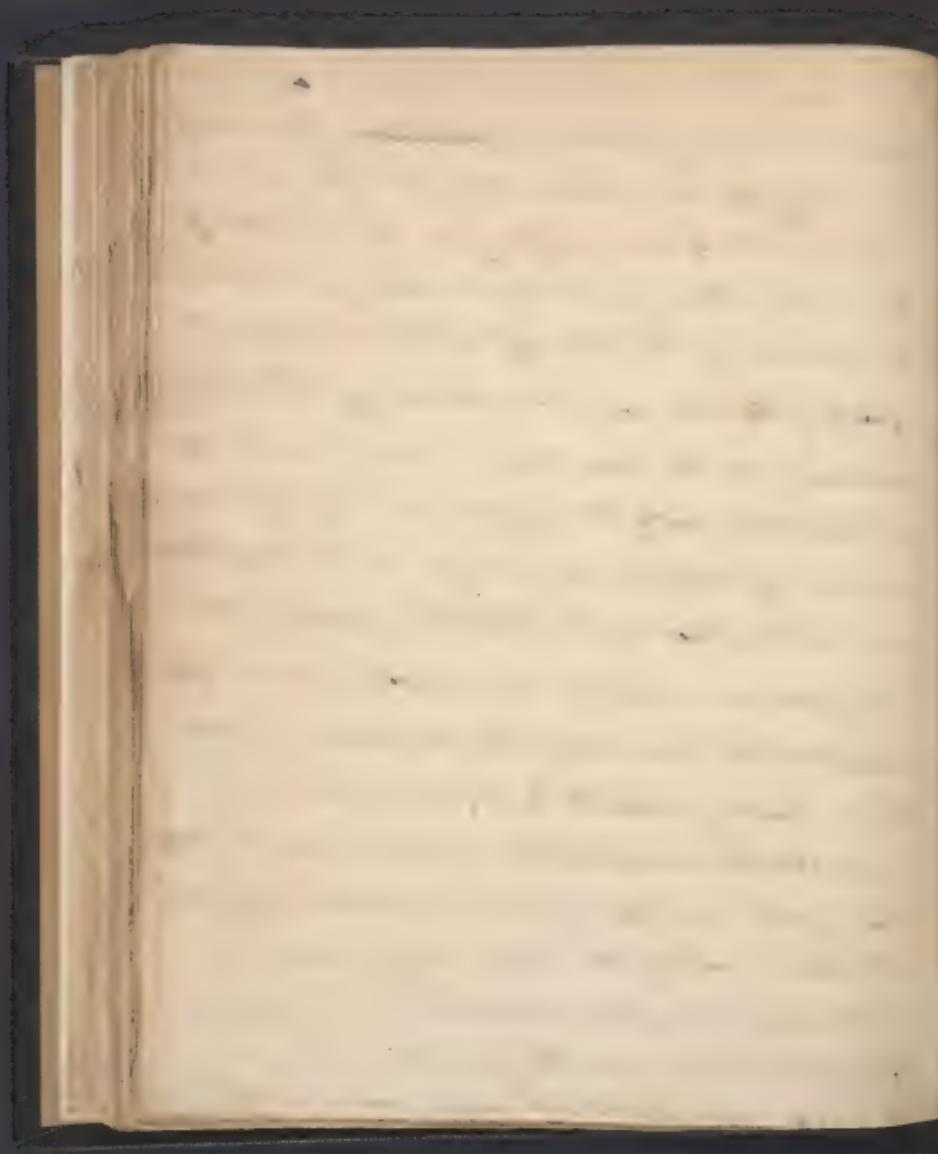


## Symptoms.

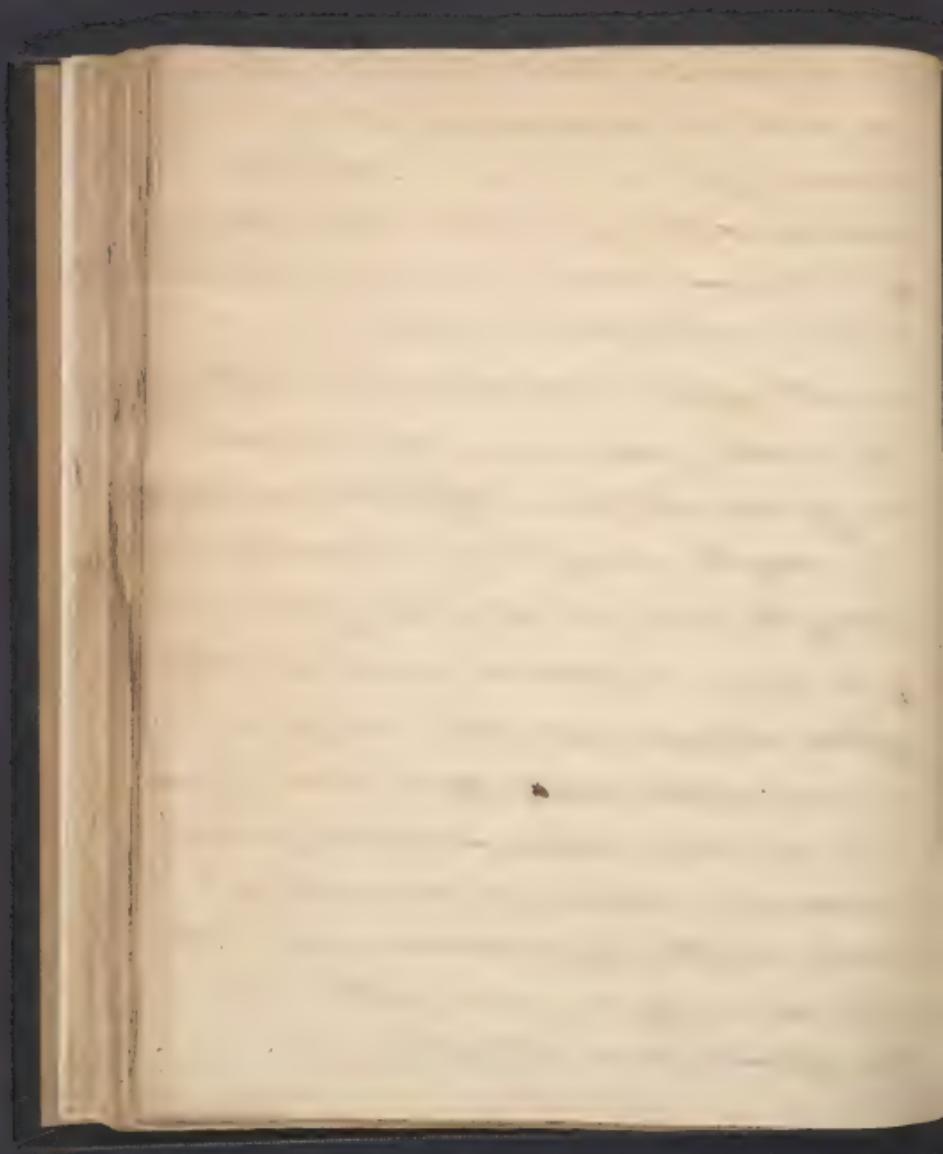
When this disease is brought on from cold, it generally makes its appearance; a few days after the applications of such colds. But when arising from punctures or lassions of the Nerves, muscles, or tendons, it does not appear so soon. It may usually not appear till after the tenth day; but there are instances, in which 6 or 8 weeks have elapsed, after the last related exciting cause. Often do we see tetanus come on from wounds, when the patient is doing to all appearance well the wound healing kindly; the pain much diminished in the part, and the general health of the patient good. Then suddenly an acute pain, extending up the limb when from wounds of the arms or legs, to the neck, back, & frequently to the root of the tongue. Which pain is succeeded by spasm of the muscles of those parts, constituting what is called tetanus.



The disease sometimes comes on suddenly to a violent degree, but more generally it ~~approaches~~ approaches by slow degrees to its violent state. In this case it comes on with a sense of stiffness in the back part of the neck, which gradually increasing, renders the motions of the head difficult & painful. As the rigidity of the neck comes on increasing, there is commonly at the same time a sense of uneasiness felt about the root of the tongue, which by degrees, becomes difficulty of swallowing, and at length an entire interruption of it. While the rigidity of the neck goes on increasing, there arises a pain, often violent at the lower end of the sternum, and from thence shooting into the back. When this pain arises, all the muscles of the neck, and particularly those of the back part of it, are immediately affected with spasm, pulling the head strongly backwards. At the same time, the muscles that pull up the lower jaw, which upon the first approaches of the Disease were affected with some motion,



"are now generally affected with more violent spasms,  
and sets the teeth so closely together that they do  
not admit of the smallest opening. When the disease  
has advanced thus far, the pain at the bottom of  
the sternum returns very frequently; and with  
it the spasms of the hind neck & lower jaw, are re-  
newed with violence & much pain. As the disease  
thus proceeds, a greater number of muscles comes  
to be affected with spasms. After those of the neck,  
those along the whole of the spine becomes affected,  
rending the trunk of the body. During the whole  
of the disease, the abdominal muscles are violently  
affected with spasms, so the belly is strongly retracted,  
and feels hard like a ~~lizard~~. At length the flexors  
of the head & trunk becomes so strongly affected as  
to balance the extensors, and to keep the head  
& trunk straight, & rigidly extended, incapable of  
being moved in any way; and it is to this state the  
term of tetanus has been strictly applied."



At the height of the disease, every organ of voluntary motion seems to be affected; & amongst the rest, the muscles of the face. The forehead is drawn up into furrows, the eyes, sometimes distorted, are commonly rigid, & immovable in their sockets; the nose is drawn up, and the whole countenance expresses the most violent grinning. Under this universal spasm, a violent convulsion commonly comes on, and puts an end to life. — These spasms are every where attended with most violent pains. The utmost violence of spasm is however, not constant, but, often subsisting for a minute or two, the muscles admit of some remission of their contraction, altho' of no such relaxation as can allow the action of those organs

This remission of contraction gives also some respite from pain; but neither is of long duration. From time to time, the violent contractions & pains are renewed sometimes every ten or fifteen minutes, and that often without any evident exciting cause. But such a cause frequently occurs, for almost every other



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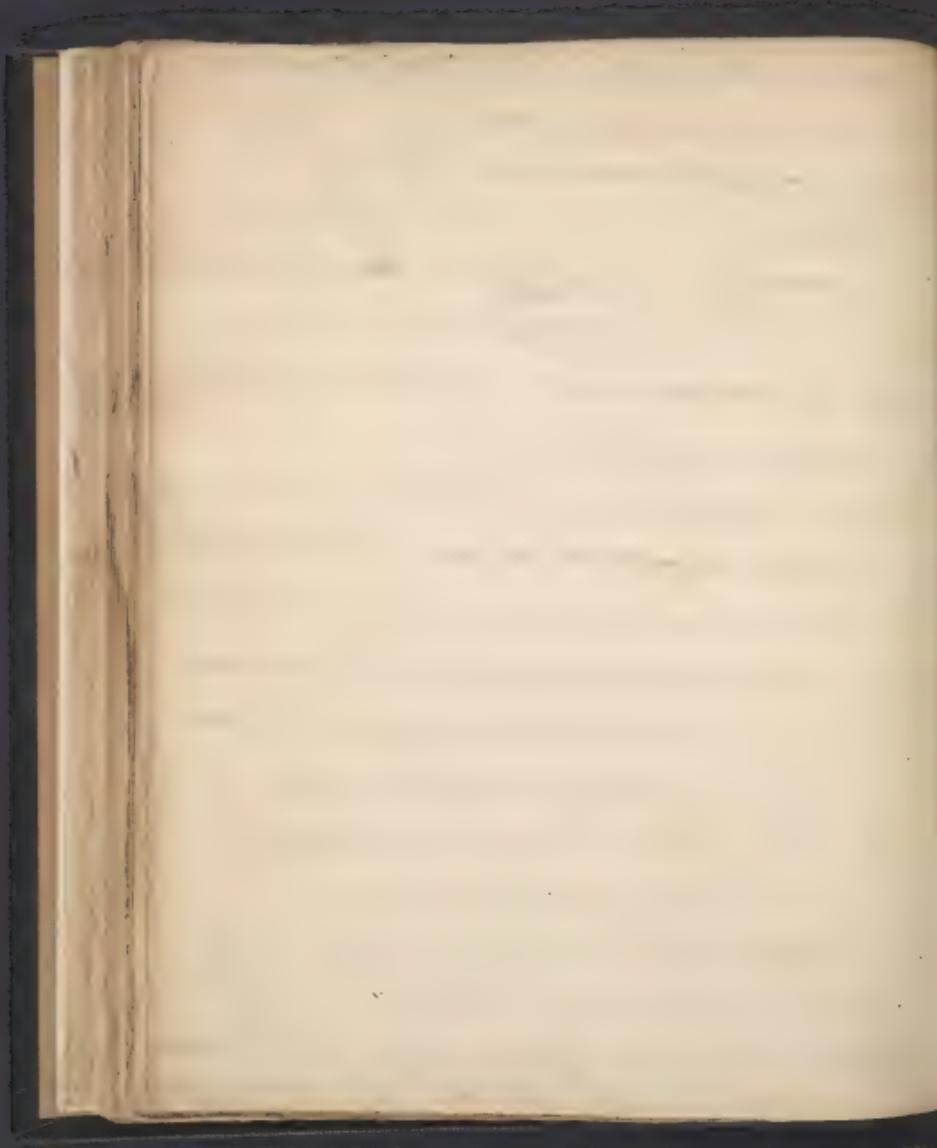
"motion, as attempting a change of posture, endeavouring to swallow, & even to speak, sometimes gives occasions for a renewal of the spasms over the whole body."

"Although fever is not a constant attendant of this disease, especially when arising from lesions of nerves, yet in those cases, <sup>producing</sup> resulting from cold, a fever sometimes has supervened, and is said to have been attended with inflammatory ~~symptoms~~ symptoms."

"Blood has been often drawn in this disease, but never exhibits any inflammatory exudat; and all accounts seem to agree, that blood drawn seems to be of a lesser texture than ordinary, and that it does not coagulates in the usual manner."

"In this disease the head is seldom affected with delirium or even confusion of thought, till the last stage of it when, by the upright shock of a violent Distemper, every function of the system is greatly disordered."

"Tetanus often proves fatal before the fourth day, and when a patient has passed this period, he may be supposed to be in greater safety, & in general the disease



is the safer the longer it has continued: It is however,  
to be particularly observed that even for many days  
after the fourth, the disease continues to be dangerous;  
& even after some considerable abatement of its  
force, it is ready to recur again with its former vir-  
ulence & danger. It never admits of any sudden, or  
whole & critical resolution; but always needs  
of degrees only, & it is often very long before the  
whole of the symptoms disappear" \*

### Predisposing causes.

These are all such as induce debility either directly,  
indirectly,  
or particularly of the muscles.

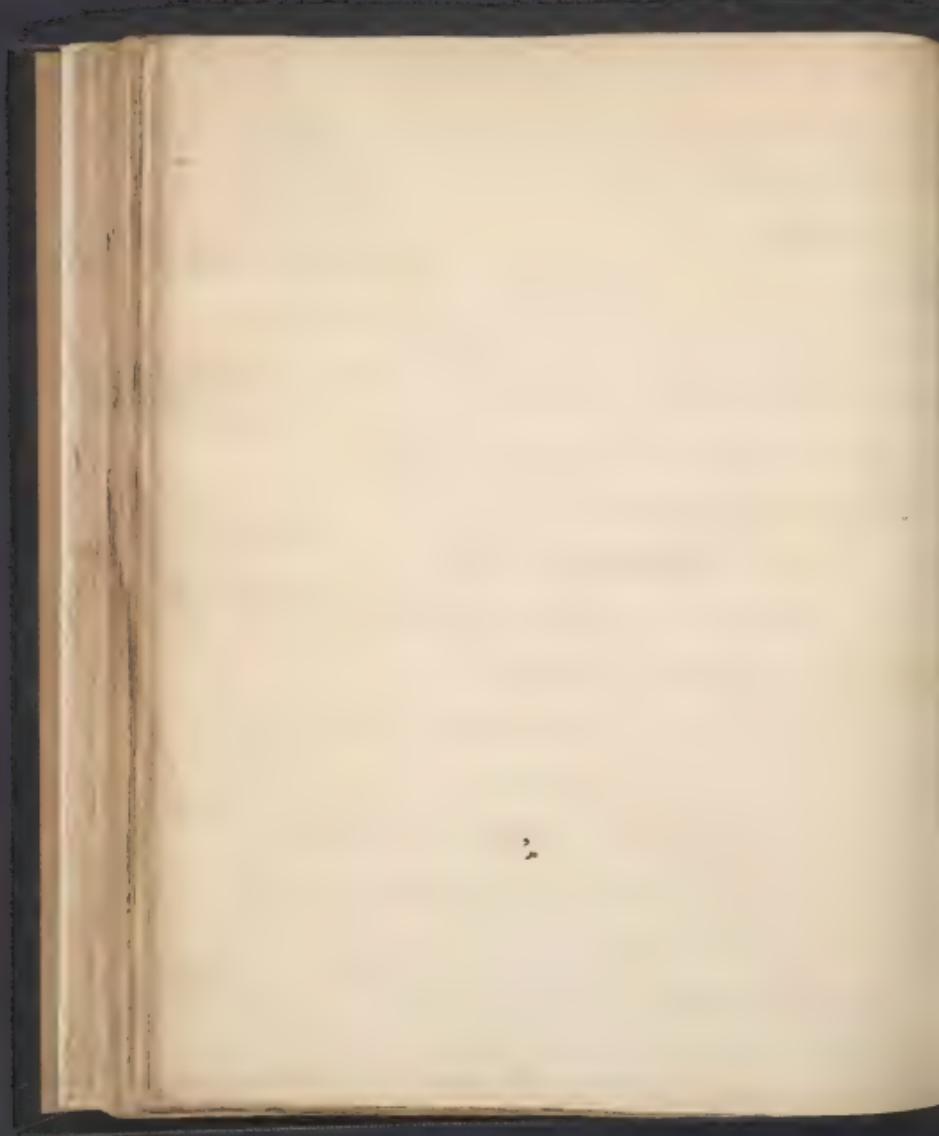
1. Cold, this has long been considered as an active  
agent in producing debility.

2. Habituating passions of fear, grief, & despair.

3. Want of sufficient aliment. All these act directly  
in inducing this debility.

4. Heat. This is universally acknowledged to be the predisposing

\* See next section.



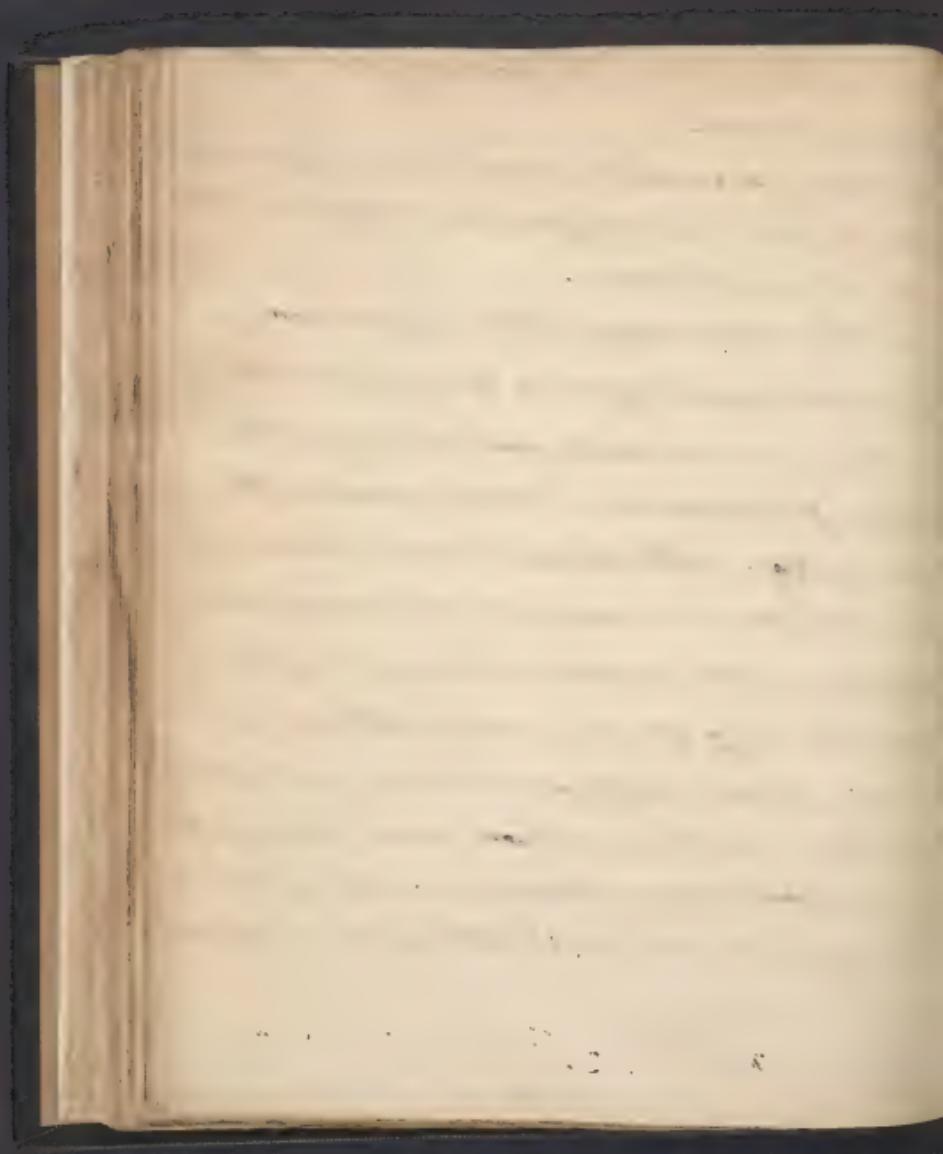
cause of tetanus. Hence the frequency of it in the tropical climates.

5. Unusual labour and exercise: hence we find tetanus more frequent occurring; from wounds received in battle, than at any other time.

To these causes may be added excess in venery, and indeed every thing which tends to induce debility.

From what has already been said, I suppose that debility from abstraction or action, constitutes the predisposition of this disease. However, this debility does not appear to be universal, but is more particularly seated in the muscles, which may be inferred from their being almost exclusively the seats of the disease, for were debility equal in every part of the body, we would have universal disease; as many of the occasional causes of tetanus, are such as frequently inducing fever when preceded by requisite predisposition.

(((((( )))))



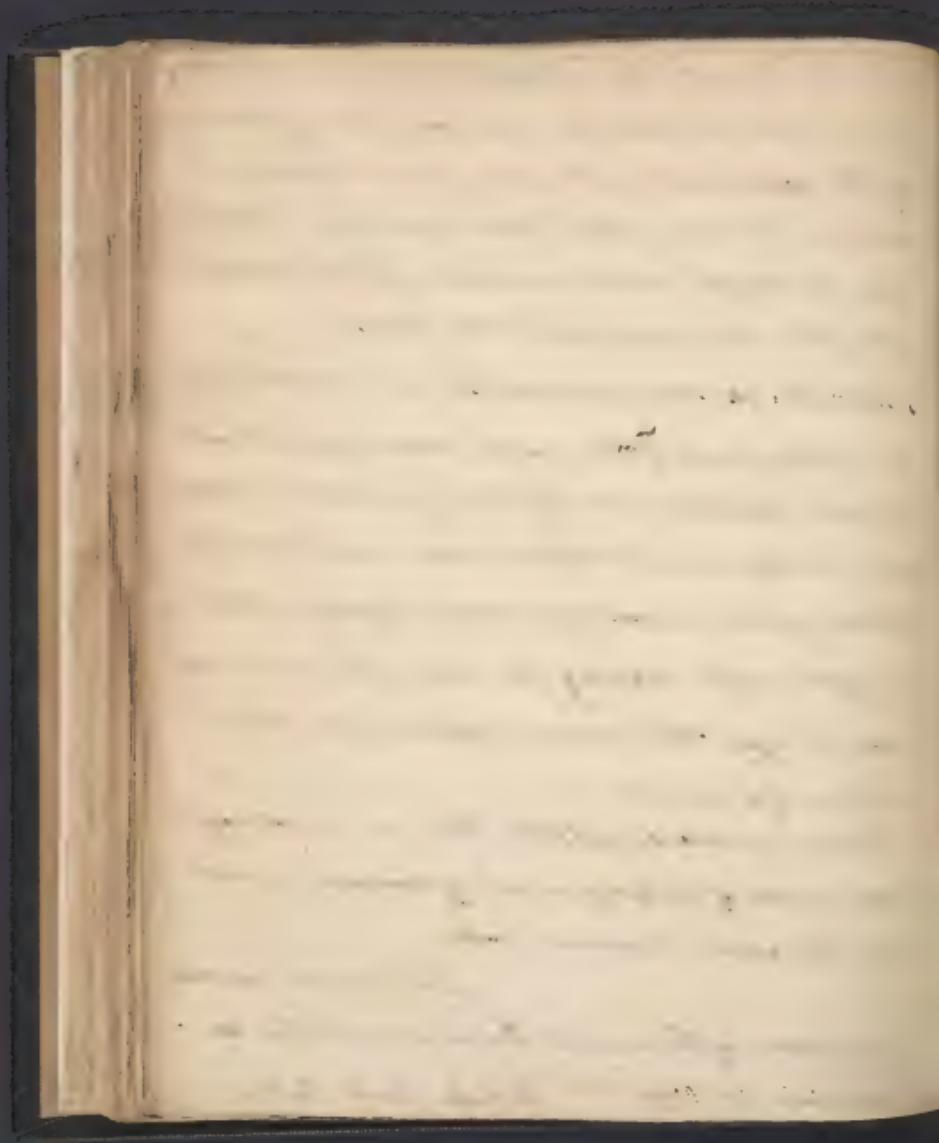
## Of the exciting causes.

The partial division of a nerve or tendon, was believed by the ancients, to be the most frequent cause of this disease. But since those times experience & observation has taught us that superficial wounds, on any part of the body, may excite the disease.

Cold, this in some instances has been known to be the exciting cause of this disease, more especially after exposure to intense heat. Of this Dr. Gridstone mentions many instances.— Dr. Holme relates an instance of its having been induced by a person's sleeping without a night cap after shaving his head. The cool air more certainly brings on this disease, if applied to the body in the form of a current.

Contain poisonous vegetables. There are several cases upon record of its being induced by hemlock, Dropwort and the *Datura stramonium*.<sup>(\*)</sup>

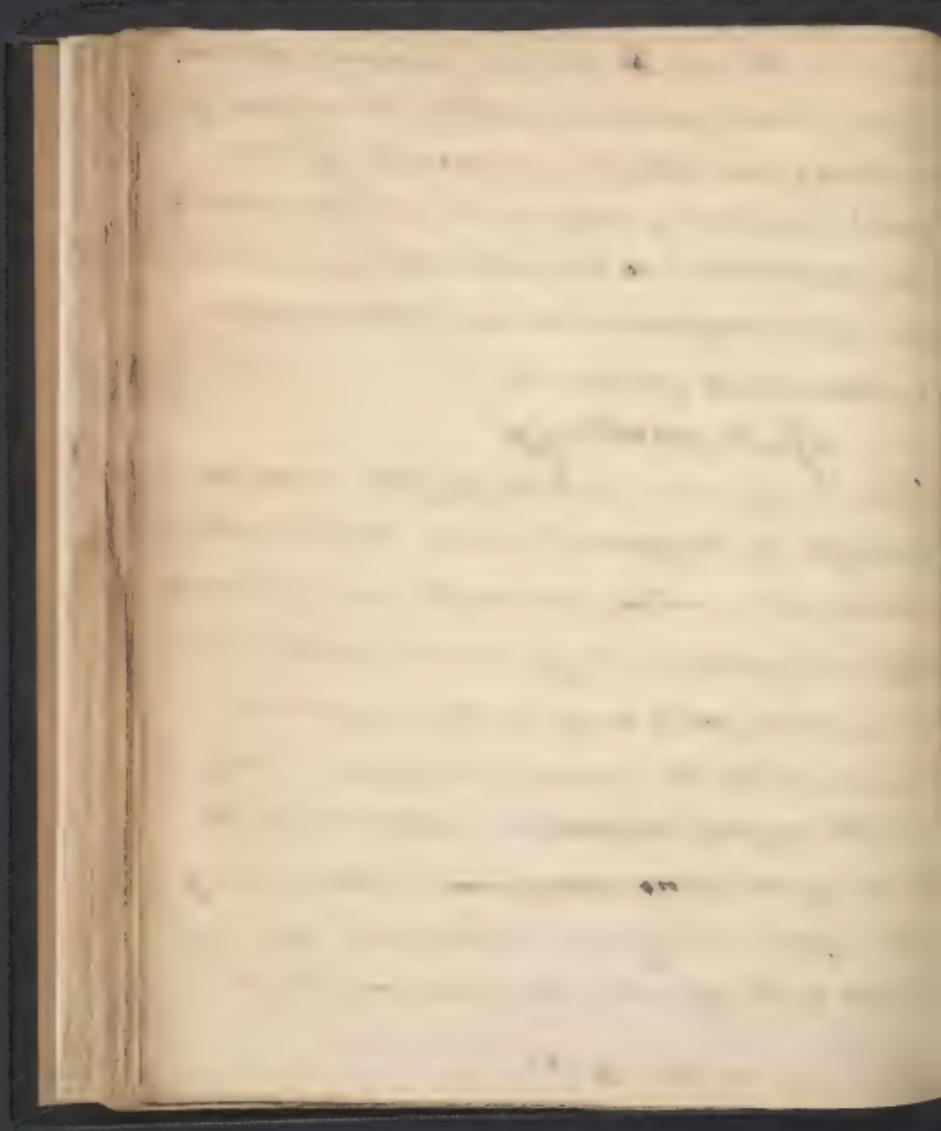
"Lastly certain emotions and passions of the mind." Terror brought it on a  
Health work vol 1 page 152 Ch Flatt & Bristo Lect.



brewer in the city. He had been previously debilitated by great labour, in warm weather. I have heard of its having been induced in a man, by agitation of mind, occasioned by seeing a girl trist upon a nail. Fear excited it in a soldier who tumbled down to be shot. upon being pardoned he was unable to rise, from a sudden attack of tetanus.

### Of The pathology.

From the symptoms and many of the causes, am naturally led to suppose the disease to exist in the muscles, but in what manner the causes act appears difficult to ascertain. Merely seems to suppose that it is a spasm seated only in the muscles or subservient to the animal functions. And this whether original ~~originated~~, or symptomatical; & caused by irritating impressions, which depending alike upon irritating impressions, made upon any one part of the body, producing morbid excitement,

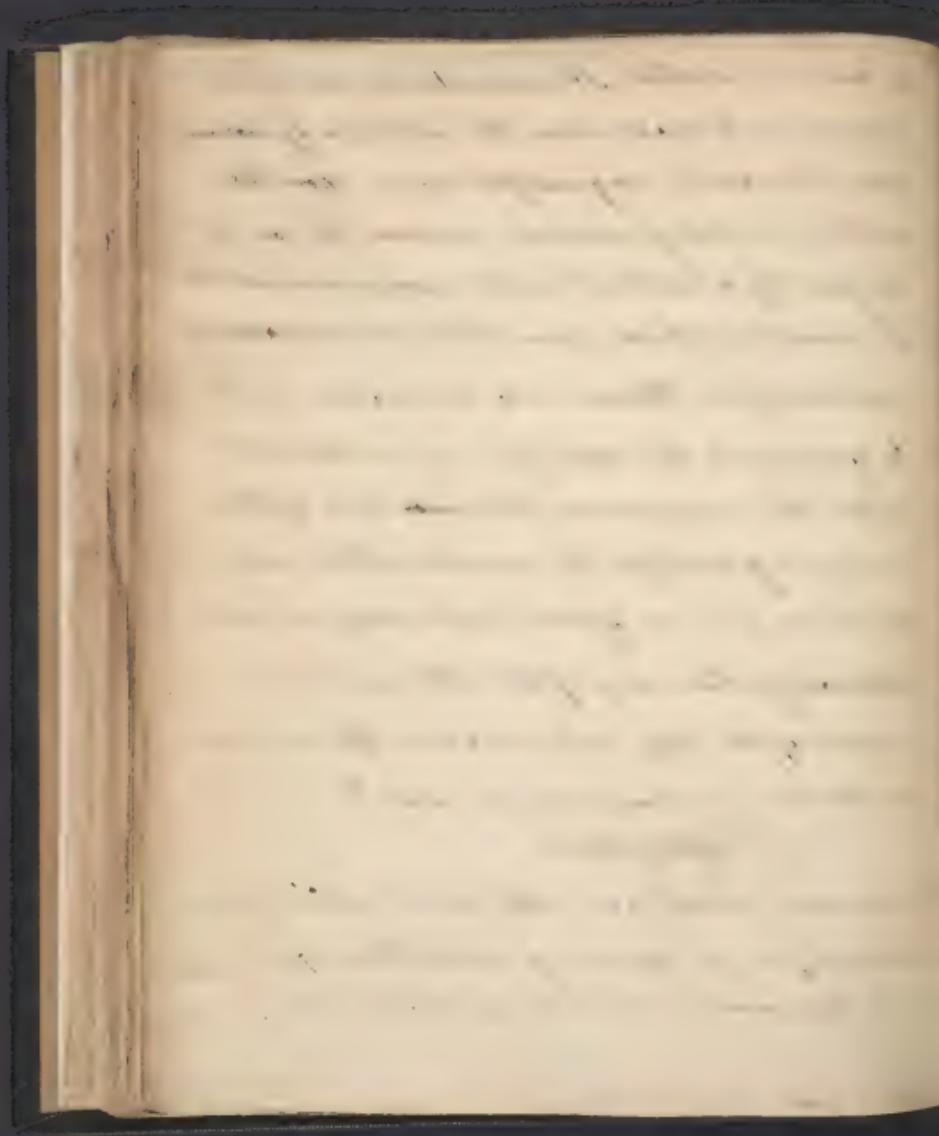


or disease in another. It is immaterial whether the impression be made upon the intestines by worms, upon the ear by ungrateful noise, upon the mind by a strong emotion, or upon the sole of the foot by a nail; it is alike communicated to the muscles, which from their previous debility & irritability are thrown into commotion by it.

In yielding to the impressions of irritants, they follow their contractions the order order of their predisposing debility. The muscles which move the lower jaw are affected more easily, and more obstinately than any of the other external muscles of the body, only because they are more constantly in a relaxed or idle state.

### *Prophylaxis.*

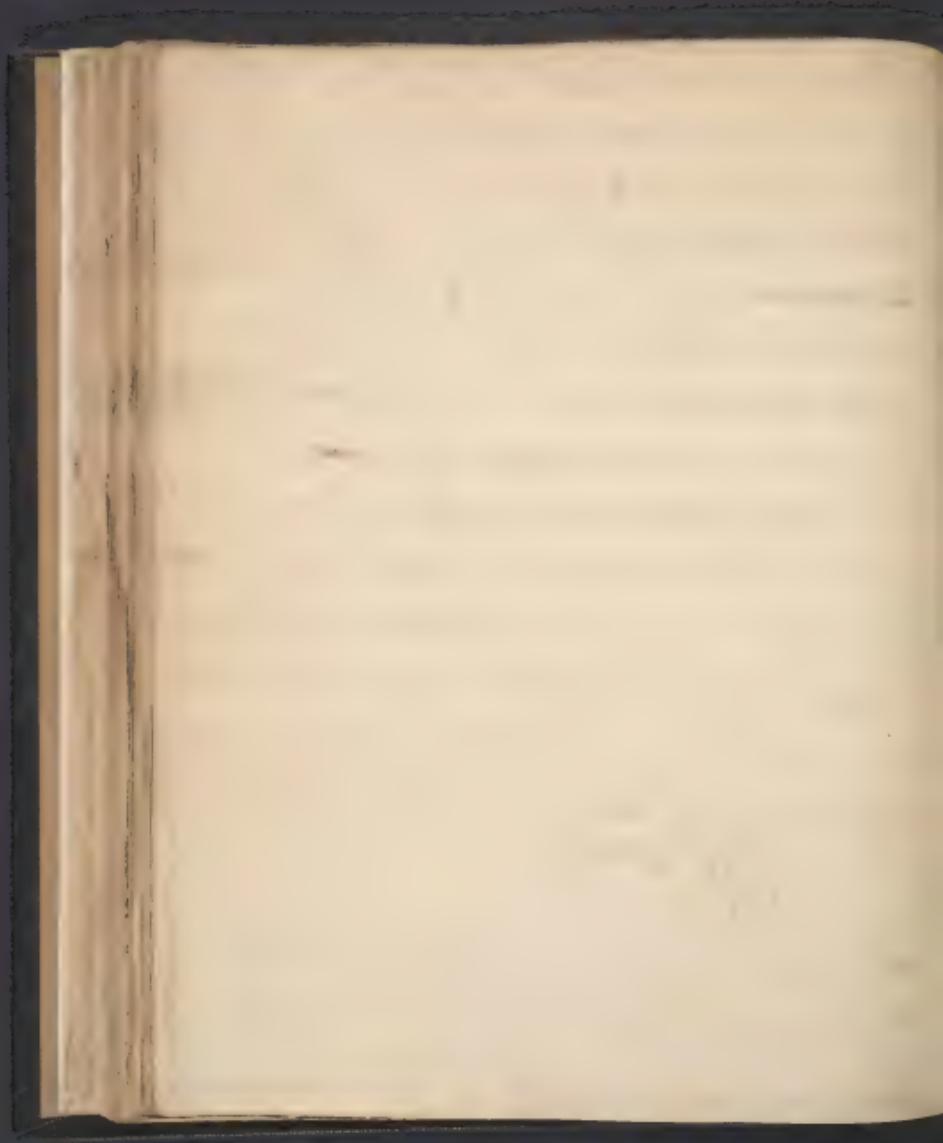
Few diseases, which can with more certainty be prevented, in its forming state than tetanus; and to this period we should be particular attention.



Thus from all its causes, has nearly the same premonitory symptoms. These are stiffness, in neck, a disposition to bend forward, in order to relieve a pain in the back, costiveness, a pain ~~in the back~~ about the region of the stomach, & a disposition to start in sleep. In this feeble state of the disease, an emetic, a strong dose of laudanum, the warm bath, or a few doses of Bork, have often prevented it being completely formed. When it has arisen from a wound, detaching it if small or healed, and afterward inflaming it, by applying to it turpentine common salt, corrosive sublimate, or Spanish flies, have in many hurried instances been attended with voluntary efforts.<sup>13</sup>

### CURE.

The indications of cure are 1st to lessen or obtrat the mortis excitement of the muscles, which may be



accomplish 1<sup>st</sup> by Bloodletting, 2<sup>d</sup> Emetics. & 3<sup>d</sup> purgatives.  
& 2<sup>d</sup> after sufficient depletion to remove or overcome  
the disease by tonics remedies. These are opium,  
& Bark. Wine. A bit of Amber. 5 cold & hot baths every  
each of which I shall briefly mention. — — —

Bloodletting I find, has been mentioned as early  
as Hippocrates, & has been found very beneficial  
in bilious, arising from cold; which according  
to Hillery's observation, are generally attended with  
phlogistic Diathesis. It likewise has been found  
useful when arising from wounds attended with  
inflammatory symptoms.

#### Emetics & Cathartics.

These have been employed in some cases with  
success; especially "When the disease is the effect  
of fever, the same remedies should be given as  
are employed in the cure of that fever. There once  
unlocked the jaw of a woman, who was seized at  
the same time with a remitting fever by emetics"



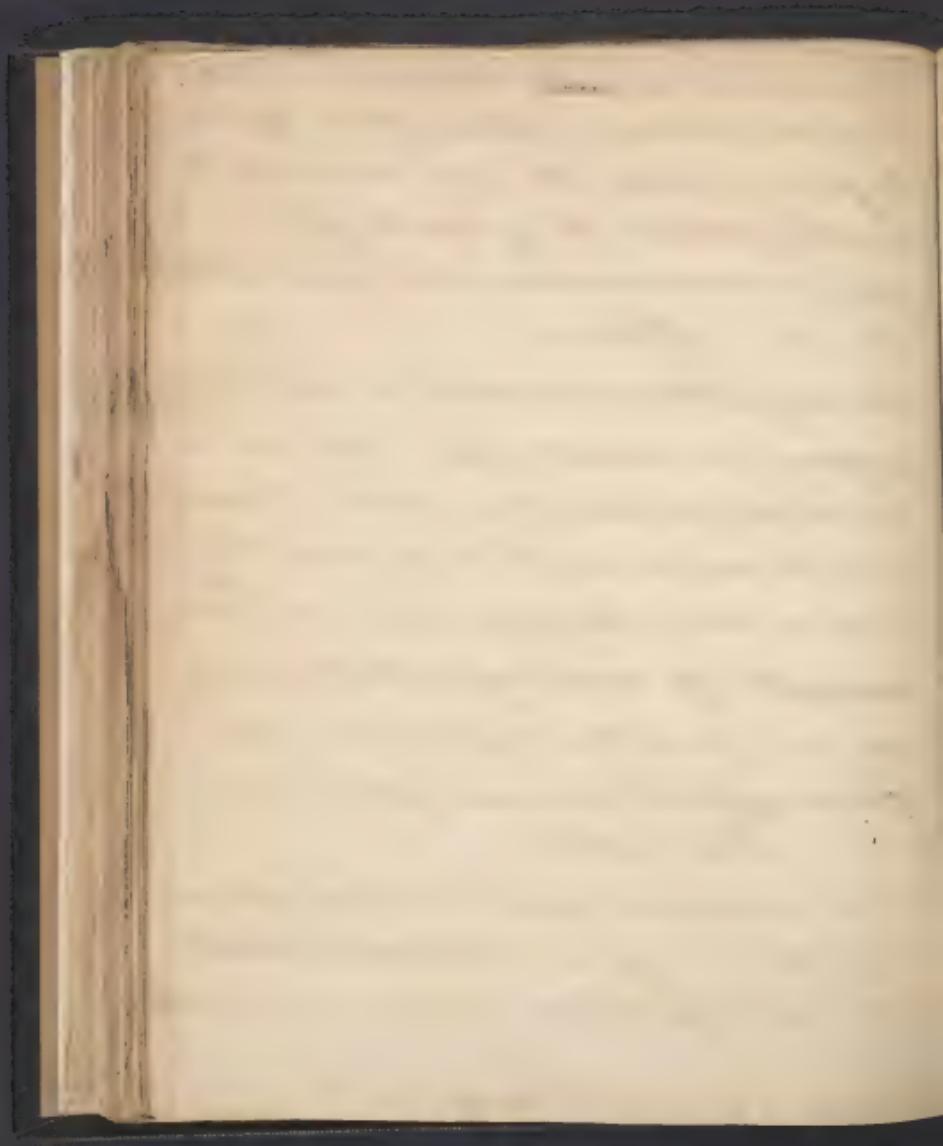
They also prove serviceable, when acid substances or poisons are taken into the stomach. Purges may be used with a view to evacuate the alimentary canal, thereby expelling the acid fæces and sometimes worms which cause irritation. — — Opium. — — —

According to Holmes opium is universally necessary; and it must be given with a bold hand, and at short intervals of time between the doses; until the end is answered. Moseley observes it has been given to the extent of one drachm every two or three hours, together for several days without inducing sleep. But sleep in those large doses, do we often find it ineffectual in removing this disease.

#### Bark and Wine.

I must mention one case, in which the opium had failed in large and repeated doses. Then it was immediately dismissed; and gave large quantities

\* Holmes on Diseases of South Carolina : page 28

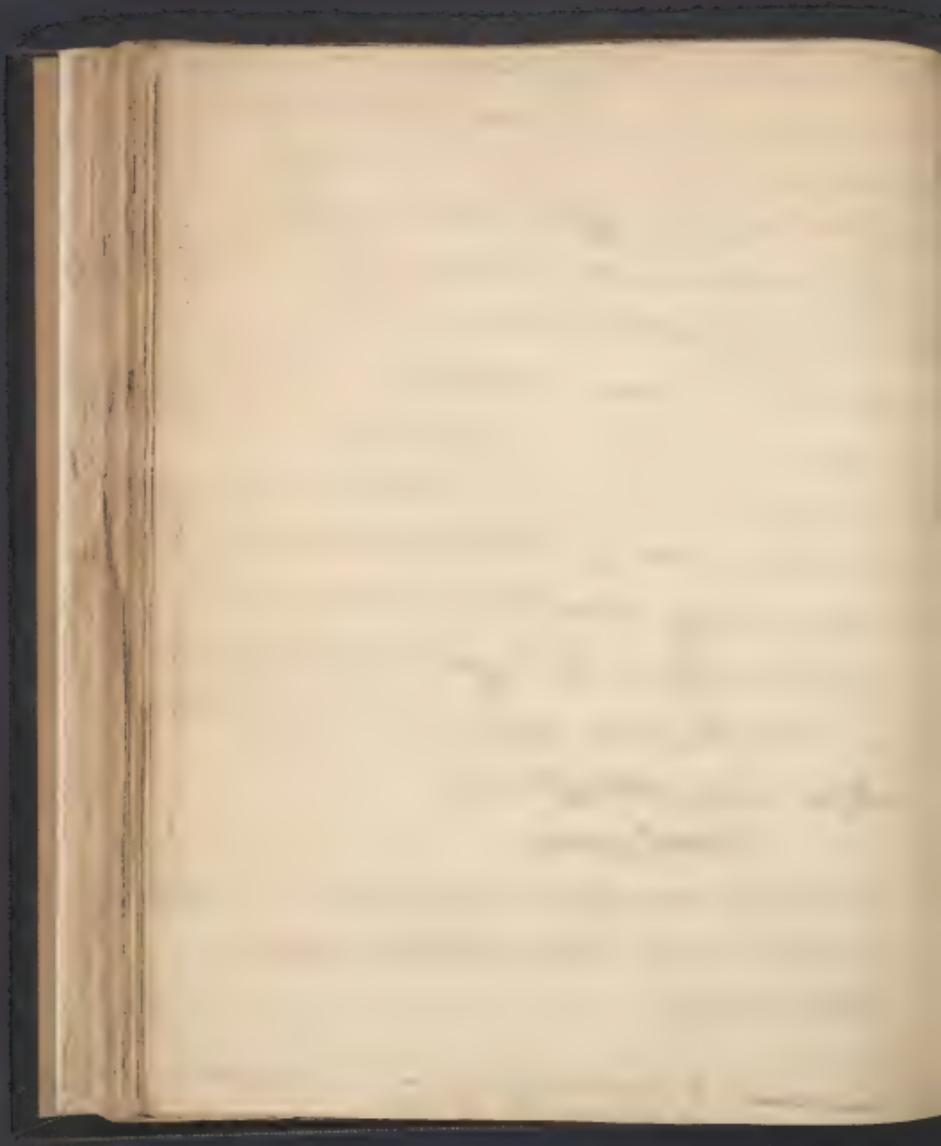


of bark and wine, to the amount of two or three  
ounces of the former, and from a bottle to three  
pints of the latter in a day; in a few hours I was  
dilighted with their effect. His spasms & pains were  
less frequent & violent, & he slept for several hours,  
which he had not done for several days and nights  
before. With the same indication in view, I  
applied a blister between his shoulders, and rub-  
bed in two or three ounces of mineral salve  
upon the outside of his throat. He continued to  
mend gradually under the operation of these  
medicines, so that in ten days he was out of dan-  
ger. Altho' the spasm continued in his wounded  
foot for several weeks afterwards.

### Ardent spirits.

A quack in New England has lately come into promi-  
nence by giving in such large quantities as to produce  
intoxication &

<sup>+</sup> See Memoirs of the Socy. of London cap. II. p. 110



## Oil of Amber.

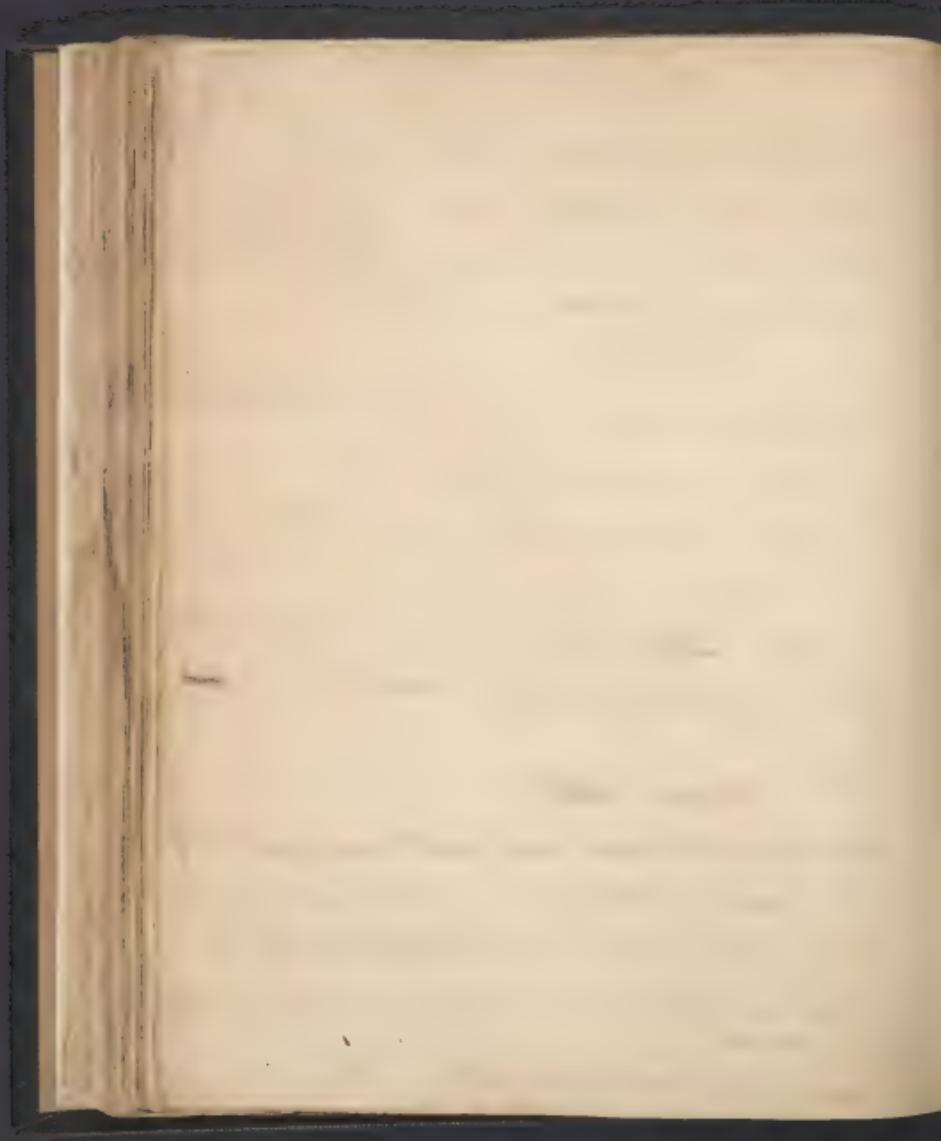
This from its action on the muscular system is much recommended by many author in the cure of tetanus; and should be given in considerable doses and repeated.

## Cold bath.

This has in many instances performed cures; we find it mentioned by Hippocrates, and since his time is recommended by many authors. In one of two cases in which I have used it with success, the patient's jaw opened in a few minutes after the effusion of a single bucket upon her ~~body~~

## 607. Warm bath.

This has often been used with success. Mostly cured a Captain Thompson of a tetanus, only by putting him into a warm bath, three times a day; and given him small doses of laudanum.



um & antimonial wine. This medicine kept up a great perspiration, caused by the bath; which I judged to be the most proper method of treating a tetanus as his was from obstructed perspiration, from the night air.

### Mercury.

This has been employed with a view to solvate by many practitioners; and when this could be accomplished, the disease generally terminated favorable. Dr Young mentions a case, which he cured by means of this medicine, after opium wine, Bark, & oil of Amber had failed. Dr Rush also said he saw a case which was cured in the hospital by this medicine. But unfortunately the Stimulation cannot be generally excited early enough to be of service.

### Seations.

Hare ~~been~~ often been used with advantage. Desportes says, he cured a negro woman, by making a section & moisten the <sup>25</sup> torpid climate Discours page 403  
The author made this experiment

hunc. Hoc est quod vocatur ambo. Quod dicitur  
ambo in p[ro]posito significat illud ut et signum  
huiusmodi. Etiamque omnia huiusmodi sunt illud ut  
et signum illud modis  
dimicillo

Hoc est enim a domini signum non sed illud  
a domino sicut hoc manifestum p[ro]p[ter]eum  
domini signum nunc illud significare  
videtur. Quod etiammodum quid? Dicitur  
quod est signum de propria p[er]sona et hoc est  
dicitur quod est signum de propria p[er]sona et hoc est  
de domino signum videtur dicitur non de domino illud  
de propria p[er]sona. Etiamque illud significare  
signum de proprio signum et nunc videtur  
signum de proprio signum.

Et hoc significare dicitur non nisi sed videtur  
signum de proprio signum et nunc videtur signum de proprio  
signum de proprio signum et nunc videtur signum de proprio

in her neck, with an hot needle.

Blisters.

Dyndestone command. Blisters on high  
terms in this disease. He says he never saw it  
prove fatal, even where they only produced a  
redness on the skin! x

